A comparative Study of Meteoroid Fragmentation during Geminid and Leonid Meteor showers using MST radar

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It is known that meteoroid mass is deposited in the upper atmosphere either through fragmentation or through differential and simple ablation mechanisms. Each mechanism deposits the flux in different form (dust/ smoke - fragmentation, atomic form - ablation). The comparative studies of meteoroid fragmentation occurred during Geminid and Leonid showers are discussed here. After two years of observations of each shower(i.e. Geminids 2011 & 2014 and Leonids 2010 & 2014) with the aid of MST Radar (at NARL, Gadanki, India) we bring into light an important outcome and are first to report that the asteroid originated meteoroids (Geminids) are undergoing less fragmentation when compared to comet originated meteoroids (Leonids). During the observations of Geminid Meteor shower (parent body - Phaethon 3200) it is found that the percentage of meteoroid fragmentation (14%) is lower than that observed during Leonid meteor shower (20%) (parent body - comet 55P/ Tempel - tuttle). This outcome has importance of its own as their parent bodies are different, the former shower being asteroid originated and the later comet originated. Even though fragmentation is mass dependent mechanism, where meteoroids with mass less than few micrograms are less prone for fragmentation we conclude here with substantial evidence and through thorough discussions that meteoroid fragmentation is different for different showers and depends on the chemical composition of the parent body of the meteoroids from which they are originated from. These results will also contribute in improving current meteoroid single body / dust ball ablation models.